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THE CHINESE A2/AD STRATEGY – POLITICAL IMPLICATIONS FOR THE SPACE SECURITY

CHIŃSKA STRATEGIA A2/AD. POLITYCZNE IMPLIKACJE DLA BEZPIECZEŃSTWA W PRZESTRZENI KOSMICZNEJ

Abstract: This paper is supposed to analyze briefly one of key elements of the Chinese strategy aimed on weakening the American military dominance, with the special attention to the role of space systems therein. It describes in the most general terms the military strategy of the United Statest, then it pictures the Chinese *A2/AD* (*anti-access/area denial*) concept as an asymmetric answer to the U.S. military supremacy. The special attention is paid to its limitations and the role of space systems in overcoming the restraints. And finally it characterizes some of the political consequences that come out of all the above and that might reflect on the general state of the space security.

Keywords: International relations, international security, space security, space weapons, A2/AD, China, USA.

Streszczenie: Niniejszy artykuł ma za zadanie pokrótce scharakteryzować jeden z podstawowych elementów chińskiej strategii ograniczania militarnej dominacji USA, ze szczególnym uwzględnieniem roli systemów kosmicznych. W najbardziej ogólnych kategoriach omawia więc amerykańską strategię militarną; a następnie opisuje chińską koncepcję A2/AD jako asymetryczną odpowiedź na amerykańską przewagę. Szczególną uwagę zwracamy na ograniczenia tej koncepcji i rolę systemów kosmicznych w ich przezwyciężaniu. I wreszcie omawiamy niektóre polityczne konsekwencje powyższego, które mogą oddziaływać na stan bezpieczeństwa kosmicznego.

Słowa kluczowe: Stosunki międzynarodowe, bezpieczeństwo międzynarodowe, bezpieczeństwo kosmiczne, broń kosmiczna, A2/AD, Chiny, USA.

The People's Republic of China expanded its space-borne capabilities noticeably within the last few decades by launching a great number of satellites into orbits. This way the capacity of the state and the commercial sector to benefit from the characteristics of the outer space increased significantly – the international prestige gained is also of a great value. And so, we can observe a relatively fast increase in size and potential of the Chinese satellite constellations, more and more ambitious scientific missions and an evolution of the ability to impact other countries' satellite systems. All those developments are related mostly to the national security and especially to its military dimension.

The basic reference point of the whole Chinese space program is the United States. It is obvious, because China's ambitions to emerge as a power with the ability to take part in shaping of the international order are more and more geographically widespread (Lind, p. 74) and increasingly backed by the military means (Rahmat, Willett). By doing this the PRC faces the American worldwide military domination, that is supportive of the global reach of the Washington's multi-faceted interests. And as China asserts that it does not accept the United States as the sole actor that dictates the rules of conduct in the world to its own selfish interests, Beijing is poised to confront the military might of the U.S. first place. That is why China prepares multilayered and long time-frame activities bound to diminish a military preponderance of the United States, through „[…] producing capabilities that have the potential to reduce core U.S. military technological advantages […]" (Office of the Secretary of Defense, p. II). This is supposed, in turn, to amplify a pace of erosion of the American political and economic influence. What is especially important from a point of view of this article is that capabilities, strategies and military infrastructure developed for that task increasingly rely on the use of orbital systems. Simultaneously, China consequently develops counter-satellite systems to threaten the American space based assets that are indispensable force multipliers. This way the outer space has became an important arena of the U.S.-Chinese competition, and in the future it may likely turn into a field of confrontation. But, conversely, it might also become a common ground for cooperation in the security realm.

This paper is supposed to analyze briefly one of key elements of the Chinese strategy aimed on weakening the American military dominance, with the special attention to the role of space systems therein. This, in turn, will lead to the evaluation of some interesting political consequences from a wider perspective of the space security. But to reach this conclusion it is necessary to develop the picture of broader background comprising of important issues pertaining "terran" politico-military relations. Thus, firstly, we will describe in the most general terms the military strategy of the United States, understood as the instrument of support for the process of achieving the main goals of the state in the international realm. Secondly, we will picture the Chinese *A2/AD* (*anti-access/area denial*) concept that is an asymmetric answer to the U.S. military supremacy, with the special attention to its limitations and the role of space systems in overcoming the restraints. And finally, we will characterize some of the political consequences that come out of all the above and that might reflect on the general state of the space security.

It is worth to note, that while all those issues are supposed to be analyzed from a point of view of the international relations they are also deeply rooted in the modern military technology and are of course subject to the general laws of physics. It seems quite obvious, but it is not always recognized well enough, that consequences for the strategies or for the policies that stem out of the technologies' features and limitations are profound and overwhelming. It is therefore rather impossible to grasp the political processes that we are going to depict here, without understanding the underlying technologies. Thus it is necessary to at least mention some details but we will try to not to blur the argument with too many technicalities. For more detailed technical data and the analyses based on it see a meticulous and highly informative paper by noted analysts

Stephen Biddle and Ivan Oelrich: „Future Warfare in the Western Pacific: Chinese Antiaccess/Area Denial, U.S. AirSea Battle, and Command of the Commons in East Asia", published in the journal International Security in 2016 (Biddle, Oelrich).

The A2/AD Concept as the Answer to the Military Might of the United States

The term mentioned in the title above refers to the kind of military strategy that may be implemented in the peacetime, during the crises of various characters and in the all out war. This strategy may have various features in different circumstances, may also be a part of broader military campaigns or political strategies. Its evolution stems from the change in methods of warfare and means of supporting them, together with the transformation of an operational and strategic planning and a tactical training. On the other hand, the strategy as a certain concept requires the effort to obtain, maintain and improve suitable hardware and modes of operation – thus we have an exemplary feedback loop between the technology and the strategy.

In short, the *A2/AD* concept combines two intertwined activities. First is working to not to allow enemy's forces to enter a certain operational theater or otherwise designated area – this is the *anti-access*. Second is to deprive an enemy a freedom of operation inside the space of own domination in case an opponent manage to enter it – this is the *area denial*. It is worth to observe at this point, that nowadays we have only a new name for the centuries old military concept that has been present in the military thinking all the time and manifested itself in various forms of offensive defense strategies. For example, the NATO's strategy in case of war with the Warsaw Pact encompassed actions to interdict the second wave of the Red Army in Central Europe, thus prohibiting its entrance into the western European theater.

As we are going to describe the current Chinese *A2/AD* strategy, which is oriented against the United States, it is necessary to explain the American military strategy that is supposed to be foiled by China. It is for to depict the context in which further considerations are more comprehensive and clear. Of course the general U.S. military strategy is well known and is widely analyzed and commented, but it should be mentioned here anyway though in short and without references redundant in this case.

Since the end of the World War II the United States implemented the strategy of global engagement, which deemed exercising the political influence in every single region of the world necessary. During the cold war there were two distinct, but closely entangled motivations behind this approach. Firstly, it was the need to contain the Soviet Union which was aggressive and expansive by its nature – the political influence was to muster and support the opposition against it. Secondly, the expanding American economy required foreign markets and resources – the political influence was to ensure its global reach. The connection between those two motivations was very important. The Soviet Union was not only the ideological and military menace for the U.S., threatening, vaguely to be true, the very existence of the country. Its expansion would also have limited or even diminished a sphere of the American economic penetration. Thus the politi-

cal influence worldwide was functional to the global expansion of the U.S. economy, because it was dangerously contested by the Soviet ideology and the political attractiveness embedded in it. Not much changed with the end of the cold war, the American political influence throughout the world is still chiefly economically motivated.

To maintain the political influence, what mean to keep friends, partners and allies connected and susceptible to the U.S. interest, Washington uses various methods from political and economic arsenals; not to mention the *soft power* of a cultural attractiveness which is an instrument of influence even if it is not manageable directly the way the others are. The next effective and important tool of sustaining the political control is the American military might. On the one hand it guarantees the security to those who co-operate and on the other it is ready to subdue unfriendly competitors. This of course requires the armed forces to be able to physically support political commitments via the deterrence as a rule or the coercion if needed. It also means that should such necessity arise, they must be ready to perform combat missions during conflicts of various intensity. To fulfill this political task the U.S. military must be credible, that is it should be obvious to everyone that it is capable to successfully execute tasks relied upon it in every possible circumstances. In the practical terms it implies that the armed forces must maintain clear superiority over every possible enemy. But this superiority does not mean neither the numerical one, because it would be too much a burden for the economy, nor the absolute argument the nuclear forces are, for it cannot be a tool of the everyday policy.

More specifically, in order to credibly guard the U.S. influence, the military must be able to sustain effective operations in the long term and in distant regions, together with conducting extensive military campaigns there. This requires the global system of force projection, based on a constellation of the fixed military installations capable to support ground and air forces, and on the powerful navy capable to sustain independent multi--purpose sea-land-air operations. Which is more the American forces must be able to operate freely in every region where they are needed. Term "freely" means nothing less than the ability to move effectively against every local competitor while keeping own losses near zero. The latter is the key to the long-term success in two ways. Firstly, it is the widely acknowledged socio-political context – the democratic societies are overly averse to casualties and this may endanger the political legitimization of any military action and the expeditionary role of armed forces as a whole. Secondly, and even more importantly in practical terms, any loss of an equipment or an element of the infrastructure entail the cost of its supplementation; it is highly undesirable because another founding feature of the U.S. military posture is its sustained nature on global scale, while at the same time keeping the military budget down as possible to not to make it too much a burden for the state and the citizenry. This way, high and frequent combat losses are not only painful politically and not only lead to a loss of the international prestige, but also make all the philosophy of the foreign policy of the USA questionable. The historical examples of Korean and especially Vietnam wars are very telling with respect to that.

The only one way to combine all this ambitious military tasks with the political and economic constrains is the superior technology. Only this may give desired advantages

over every opponent, providing crucial force multipliers that ensure the most wanted freedom of operation. And so, the nature of the military preponderance of the United States is chiefly technological. That is why the military domination over the better part of the world was achieved through quite modest, relative to the GDP, military budget. Only the Soviet Union managed to contest this superiority effectively, even though it was somewhat backward in terms of the military technology. It is worth to underline again the relative low cost of this policy as its crucial enabler. The expenses grew significantly only in times of the bigger conflicts, like Korea or South Vietnam, which were also proxy wars for the main American adversaries, Soviet Union or China.

Summarizing to this point, the United States has to date managed to successfully implement the military strategy that supported overall aims of the foreign policy and so ensured the economical impact of the United States. One of key elements of its effectiveness was the overwhelming superiority over every local competitor, through the technological supremacy.

But today this comfortable situation changes significantly. Mostly because the technologies emerge and proliferate that may disrupt the American superiority and thus nullify or at least complicate the main local strategies of the United States. As some informed observers notice, "[f]or over 70 years, the U.S. approach to projecting power has centered on building up ground and air forces at forward bases and positioning its fleet close to the enemy's shores. But with ever-greater numbers of missiles and aircraft armed with precision-guided munitions, China and other rivals are increasingly able to target U.S. forces at greater distances." (Thornbery, Krepinevich, p. 27)

The problem here is not only an overall advancement of the military technology, which is being developed throughout the world. It is especially important that we witness the rapid spread of some specific applications that may endanger crucial elements of the American power projection system, thus putting the whole U.S. global strategy in jeopardy. And to do this it is not necessary to develop the better air force or the better navy to prevail in the decisive battle. Some other, much more modest in terms of size and cost, means of warfare may be applied within asymmetric strategies aimed at the forward based or deployed supporting infrastructure of the armed forces. This way, without an all-out confrontation, the U.S. military could lose the ability to fulfill its tasks on the given theater.

An essence of this asymmetry here is as follows. To achieve their goals of deterrence or coercion, the Americans must maintain the firepower and the freedom to use it without substantial losses, through a complex system of supporting efforts and infrastructure. The local competitor on the other hand, may only hit the elements of support to eliminate the U.S. combat forces, if only the weapons available allow. And today the technologies materialize with the potential to do just that and the concepts to use them against the U.S. are being crafted. The *A2/AD* strategy is the realization of this asymmetric philosophy to push the United States out of certain regions without confronting the American forces in a conventional battle. The ultimate aim is to diminish and finally nullify the American political influence in the given region; furthermore it should lead to a deterioration of the U.S. economic power.

All the above applies to an extent to the situation in the Western Pacific theatre, where the American military influence is being increasingly questioned by the Chinese anti access capabilities that are combined with the cohesive strategic concept. The most general logic of this strategy is as follows.

In the peacetime *A2/AD* assets are supposed to be a tool of control of the strategically important swaths of sea and an instrument of the deterrence, effective even against overly superior, in general military terms, opponent, that the United States is and will remain for the time being. The anti access strategy is then to create a sort of the buffer zone, adding uncertainty to the US contingency planning. It is the policy of rising stakes in case of the conflict, that should mitigate the U.S. in its actions to keep the contested areas open. To be exact, in the peacetime the freedom of navigation will of course be maintained formally, but the U.S. Navy and U.S. Air Force will always be "under the gun" while entering certain areas – it means the situation when the naval or air assets may be instantly attacked and inflicted heavy damage, unacceptable from a point of view of the logic of the naturally overstretched U.S. worldwide military presence.

In times of a possible future crisis, for example the invasion of Taiwan, Chinese anti access forces would be able to deny the United States the ability to intervene freely, that means, again, with little or no losses. Washington is supposed to be assured that any involvement in the intra-Chinese conflict will be prohibitedly costly. And so it would be, for example in a case of sinking of any of the U.S. fleet carriers, for they are not only the symbol of the American power that would wane. The extreme cost[1] and low production rate[2] makes every vessel indispensable as there are just 11 ships of that class, of which usually at least two undergo overhaul, maintenance or training.

In a case of the all-out war, the *A2/AD* capabilities are supposed to prevent Chinese mainland from being attacked by the American conventional forces. Thus, the main goal of the American strategy which traditionally is to degrade an enemy's economy and infrastructure to force it to surrender, would not be possible to achieve without crossing the nuclear threshold. This should allow China to not to lose the conventional war against the U.S. and to be able to execute the most of what Beijing wanted within the contested theatre. This would be in fact the defeat of the United States.

If all the above mentioned elements of the Chinese anti access strategy are effectively implemented, it would lead to a significant deterioration of the American political influence throughout the region, even in the peacetime. Having its armed forces, the guarantor of allies' security, effectively pushed out of the region, the U.S. would gradually lose its relevance. The partners like Japan, South Korea or Taiwan would have to redefine their own priorities and policies to adapt to the situation of diminished role of the United States. In turn, without those allies the American engagement in the Western Pacific would be impossible.

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[1] The newest fleet carrier *Gerald R. Ford*, commissioned into service 22 July 2017, cost almost 13 billion USD (in 2008 dollars) (O'Rourke, 2017,1, p. unnumbered (Summary)).

[2] The next carrier to be launched, John F. Kennedy is supposed to enter service in 2024 (O'Rourke, 2017,1, p. 6).

All the consequences described above may indeed come true, because, as we already noticed, the U.S. is in the offensive position in the distant theatre, overstretched and with the rear areas vulnerable to attacks – though until now the technological domination was decisive enough to maintain such U.S. posture. But evolving *A2/AD* capabilities may give a defensive side, the Chinese in our instance, very powerful instruments that would augment the natural advantage that every defending side enjoys. It could then create the potential to strike the American force projection infrastructure and the extensive *ISR* (*intelligence, surveillance, reconnaissance*) capabilities that are an indispensable part of the U.S. technological edge. Thus, to foil the American strategy and in effect to push the United States out of the Western Pacific, Chinese forces could target first of all the supporting elements, like:

- the *ISR* system, that might be degraded by elimination or limitation of the effectiveness of the main means of optic, radiolocation and electromagnetic reconnaissance – satellite systems, airborne radar stations or stationary and airborne radiofrequency monitoring stations,
- the logistic chain, that may be broken or at least weakened through attacks against the main bases that are staging areas for the operations in the region, including the deployable bases that the American carrier groups in fact are.

Until recently the actions of this sort against the U.S. armed forces could have been undertaken only by the Soviet Union or, to lesser extent, by Russia. Only this country could have denied the United States the freedom of operation within, and, to some distance, outside its borders, while also wielding the capabilities to strike deep inside the US held areas to hit supporting infrastructure. Today however, the technologies of that kind proliferate faster and faster throughout the world and the Chinese, together with, traditionally, Russians, became the leaders in this pursuit to deprive the U.S. its superiority. In general, the A2/AD arsenal comprises of precision strike munitions like air-launched long range stand-off weapons, ballistic missiles, land- and sea-launched cruise missiles and hyperspeed glide weapons, together with long range air defense weapons, attack submarines and anti-satellite assets. The Chinese armed forces possess or will soon possess all of the mentioned classes of weapons.

The area of implementation of the Chinese *A2/AD* strategy is supposed to be mainly the South China Sea and the East China Sea with the adjacent approaches. According to Beijing's expectations those regions should be the quarters controlled by the People's Liberation Army, where the U.S. and allied forces could not operate freely. Here there is an element of the *anti-access* – a prevention of entrance of enemy's combat forces by threatening to destroy or actual destroying the fixed staging infrastructure (bases) in the vicinity and the mobile ones (carriers (Sayler) and strategic bombers) upon entrances to the region. And an *area denial* is to prevent the forces that already entered the theater (land based or ship based air attack groups, attack submarines and other land attack assets) from operating freely – it means, let us reiterate, the ability to conduct missions against targets on the mainland or within the theater with acceptably low casualties.

It is no wonder then, that the United States undertake the concentrated effort to forestall adverse effects of the maturation of the *A2/AD* strategies. It of course refers most

of all to China, as this country is perceived by the Americans as the increasingly capable peer competitor in the near future. The systemic effort to deal with the situation is called Third Offset Strategy, and it is supposed to develop complex technologies leading to the deployment of new weapons systems that could keep Chinese *A2/AD* assets in check (Cronin, Rapp-Hooper, Krejsa, p. 12). The implementation of those new capabilities is supposed to be framed into the Joint Concept for Access and Maneuver in the Global Commons (JAM-GC). It is a newly approved operational concept of the U.S. armed forces that gives a lot of attention to a suppression of the *A2/AD* capabilities (Hutchens, Dries, Perdew, Bryant, Moores). But, as Biddle and Oerlich rightly notice, "[t]he A2/AD debate is mostly about the future, not the present. For now, there is little real A2/AD threat to confront: most analysts still see U.S. naval and air superiority over the Pacific except for the immediate Chinese littoral and sometimes the airspace over Taiwan." (Bidle, Oerlich, p. 10-11)

It is a very good suggestion, because it points out to the most relevant finding, to be elaborated later on in this text, that the *A2/AD* strategy does not exist in an effective form yet. On the one hand it is being quickly developed by the Chinese, but on the other, it is being countered with great determination by the U.S. And thus the political consequences, that we are going to finally talk about by the end of this paper, and that also refer to the future developments, fit into the mostly prognostic value of the discussion on the space security.

The Limitations of the Chinese A2/AD Strategy

Regardless some sober assessments, it is often believed, that all the above mentioned strike capabilities that China has developed to date and is currently developing would soon allow Beijing to successfully establish the military domination over the South and East China Seas. And so, it looks apparent that the powerful weaponry from the *A2/AD* arsenal would eventually push the U.S. from the positions in Western Pacific – and the erosion of the political and then the economic influence of Washington would surely follow.

But it is not going to be the case, at least not in a foreseeable future of the next decade or two. The argument behind this statement points to the critically important limitations of the *A2/AD* strategy in general and of the Chinese concept specifically. Biddle and Oerlich indicate very precisely the two closely connected issues with regard to that (Biddle and Oerlich, pp. 22-23). First is the defensive nature of the Chinese anti access strategy that binds its implementation to the mainland, at least for the time being. Second is the fact that it is, again by its nature, the weak against the strong situation, and it is going to remain so for now. Altogether it means that the *A2/AD* strategy might exploit some vulnerabilities of a mightier, offensive side by a weaker defense but it is strongly limited by the geography that overwhelmingly affects operational realities. It is obvious, that the further the Chinese want to extend an effective range of their weapons systems, the more complicated, more expensive, fewer in number and more difficult to operate

they become, and thus they require better and better technology. But even more important, while to less extent acknowledged, is that to support longer range strike assets it is necessary to possess more sophisticated *ISR* capabilities that are indispensable part of any military operation.

Let us elaborate. The term *ISR* refers to the comprehensive process, executed by a very complex set of instruments and methods. It combines hardware, like the detection grid, monitoring assets, various transceiver stations with the software like analyzing algorithms, data processing tools and *C3* (*communications-command-control*) infrastructure. Its tasks are manifold, starting from general issues like getting basic information on potential targets, their properties, composition, and methods of their operational use, together with a doctrine and a level of training. More specifically it is a procedure of detection, identification and tracking of opposing forces and their elements, to fix the enemy's position and to establish the parameters of its movement. Ideally, this process should be continuous, what effectively mean the ability to constantly observe adversary's forces and to analyze their movement in the real time. It is worth to reiterate that the modern *ISR*[3] system is a very complex set of interconnected tasks and actions that form the comprehensive tool. It also implies that the means that should be used for this task are also diverse and sophisticated in order to achieve the desired effect. The biggest challenge for the *ISR* is of course the distance, the further the target is from staging areas of the assets at the disposal, the more difficult the process is and the more sophisticated technology and expensive means it requires.

And so, when we analyze the Chinese *A2/AD vs.* the U.S. military in the Western Pacific theater, we must not only take into an account the Chinese offensive capabilities. First of all, we have to assess the ability of the Chinese *ISR* system to support offensive operations at desired ranges *vs. modus operandi* of the American forces and their function in the region, with the special attention to geographical constrains.

The contested area, where the *A2/AD* strategy is to be performed includes South and East China seas. But to make it really effective the immediate approaches like Sea of Japan and Philippine Sea, together with the vast portions of Philippine and Indonesian archipelagos should also be controlled. It requires the ability to conduct effective strikes against key installations in Okinawa, central Japan and Guam, at a distances of 700, 1500, 3000 km from the Chinese mainland, respectively. Not to mention the U.S. carrier battle groups and nuclear submarines heavily laden with cruise missiles scattered across huge ocean.

In order to perform such a tremendous task the Chinese must wield vast *ISR* capabilities that would allow detecting, tracking and targeting enemy forces at great distances in the real time. And here appear the fundamental limitations of the *A2/AD* concept, that render especially the *A2* mission extremely difficult or maybe impossible.

[3] Often referred to as *ISTAR* (*intelligence, surveillance, target acquisition, reconnaissance*), what is quite proper, but the use of the expanded term would not give us much more insight but would surely blur the argument.

The main instruments of the long range sensing are obviously radar stations, supplemented by optical, infrared and passive means of reconnaissance. Optical and infrared sensors are obviously limited by the weather and distance. The passive detection depends on the enemy's emissions, usually it is also not so accurate to do more than target detection and preliminary acquisition, and they are also vulnerable to countermeasures. Thus, the radiolocation, as to the least extent depended on natural phenomena and the most flexible in terms of overcoming the countermeasures is the basis of the *ISR*.

The radar sensors' effectiveness is limited by many factors, starting from weather, artificial or natural jamming emissions to the most important and unbeatable fact that radio waves propagate only along the straight lines. It seems obvious but is frequently omitted that a radar station must have the line of sight to the object it tracks, unobstructed neither by the high terrain nor by the curvature of Earth. The latter is the most important for the maritime operations, but ships may also "hide" behind the landmasses of the islands. Of course there are over-the-horizon radar stations, they are also being built in China, but their usefulness for the *A2/AD* strategy is limited, due to the lack of precision and low resolution – they can only be used for the preliminary detection. All in all, it is the system of radar stations that form the backbone of the Chinese *ISR* available for the *A2/AD* mission. They are located on the fixed positions on the ground, on the air-borne platforms and on the ships at sea, with the addition of the recently constructed stations on the reefs and shoals of the South China Sea.

The next complication for the Chinese long range *ISR* is obviously the American still superior military power that also includes highly effective weapons designed to fight radar stations. The U.S. Forces also have an extensive expertise on the issue, because blinding the enemy by suppressing its detection system was always the core of U.S. offensive strategy. That is why we have to take for granted that in a case of the conflict the U.S. forces will be first of all targeting the Chinese *ISR* system. This will make its operation very difficult and will impose cautious, defensive use of available assets. In practical terms it means that the Chinese will have to keep their the most valuable, the most effective radar stations, especially air-borne ones, quite deep behind the defensive perimeter of own air defense. The latter comprises first of all of a large number of relatively modern ground based missile batteries and strong fighter force that operates from airfields on the Chinese mainland and on Hainan island, supplemented with ships with surface-to-air missiles at forward positions. As we can see, the air defense perimeter is strongly bound to the positions on land, and this fact is of the most profound consequences. According to Biddle and Oerlich the effective range of Chinese radar detection with such constraints is about 400-600 km seaward (Biddle and Oerlich, pp. 26-29). This covers only the immediate vicinity of the Chinese mainland without Okinawa or Japan. Any try to enlarge this range means moving air-borne assets with naval support towards the outskirts or even outside the main land-based defense perimeter. It would mean immediate powerful and probably overwhelming response from the U.S. naval and ground based forces – this will be discussed in more detail later on.

Summarizing to this point, currently fielded *ISR* assets allow China to use *A2/AD* strike capabilities against moving targets only at a relatively close range. This would

surely make the U.S. forces difficult and costly to take the positions against the Chinese mainland. But on the other hand the US carrier battle groups should be relatively safe even when inside the range of the *DF-21D* carrier-killer missiles, provided they keep the abovementioned distance. Of the fixed infrastructure, the US bases in Okinawa could probably be destroyed by the barrage of a great number of short range missiles that would saturate the defenses and cover all the area with blind salvos. But the bases in Japan are larger and the dispersion of assets could be more effective, they are also defended by strong sea and land based missile defense – there are also much fewer medium range rockets that could strike those targets. In effect, blind missile bombardment would be much less effective there, probably leaving those bases operational. Guam should survive limited attack as well.

It is of course conceivable, that the Chinese would venture some actions in order to enlarge the sphere covered by own *ISR*. This would mean great operations involving number of naval and air force assets that would escort the air-borne surveillance platforms and form the mobile perimeter against the American firepower. Such a force could try to enter open waters of South China or East China seas. But it would in fact mean the resignation from the asymmetry that is between the U.S. Navy and the Air Force and Chinese land based assets. Eventually, such a foray would end up in head-on fight against the superior U.S. armada. This decision, to go to such a battle would at the same time mean the resignation from the *A2/AD* defensive posture. It would also require a number and quality of combat assets that is unreachable by China in foreseeable future, unless Beijing decides on substantial increase in the military spending in relation to GDP. But this would in turn put the Chinese economical miracle at risk without any guarantee of yielding expected results.

One might think that the radar stations on the rocks and shoals of the South China Sea would be the solution. It is so in the peacetime and maybe during low intensity crises. But in a case of the deep crisis or especially the all-out war those positions will be overwhelmed by the U.S. forces within the hours. They simply do not have the potential to host substantial defense for their own and being far away from the mainland they cannot be properly protected by the land based forces.

Of course the PLA's navy is developing fast (O'Rourke, 2017,1) and, as some say, it could become the real blue water power within next two decades (Cronin, Rapp-Hooper, Krejsa, Sullivan, Doshi), provided huge sums of money are secured. And then it would be able to move the range of the Chinese *ISR* somehow, but it is not going to be the substantial change of situation[4]. Mainly because that in any case the Chinese navy will remain much weaker than the U.S. and allied naval forces – especially the Japanese, that is growing in strength as the country gradually takes more and more assertive military posture.

[4] To be honest we must note that some scenarios that predict the other outcome exist, but they have rather narrow chances of being fulfilled, so they are not mentioned here in order to not to blur the main argument.

"Inside its near seas, China's navy could become just as vulnerable as the United States' to anti-ship missile barrages, and beyond the first island chain Beijing's blue-water force would be without its missile force multiplier and guided by a much less robust surveillance, reconnaissance, and strike network than when closer to home." (Cronin, Rapp-Hooper, Krejsa, Sullivan, Doshi, p. 28).

Summarizing all the current developments related to the Chinese *A2/AD* strategy we must observe, that China does possess precision strike capabilities that could be used against the U.S. bases or forces as they deploy into the theater of South and East China seas. However conventional land, air and sea based *ISR* capabilities do not allow to use this assets to their full effectiveness. Currently a distance on which the *A2/AD* strategy may be executed is roughly 400-600 km from the Chinese shores. In the future, the Chinese navy and long range aviation would probably develop fast and this could change the situation to an extent, but not much, for "[…] the effectiveness of China's increasingly blue-water force will depend on a network of enabling and force-multiplying systems. Fundamentally, these revolve around the collection and exploitation of information – a surveillance, reconnaissance, and strike network able to pair robust data with precise kinetic capabilities. […] "[A]s Beijing's naval ambitions take it [Chinese navy] beyond the First Island Chain – and the sensors and missiles buttressing its strength therein – it will face the same weaknesses of the American network but with added geographic constraints." (Cronin, Rapp-Hooper, Krejsa, Sullivan, Doshi, p. 26)

The one most effective way to improve the long range *ISR* capabilities, and this brings us very close to the main point of this paper, is to place the surveillance assets in the orbits in space. The nature of the observation systems circling the world makes them be the ultimate high ground from where everything on Earth may be seen. The properly set up constellation of satellites may provide a constant control over certain regions, or even globally, with the use of optical, infrared and radar sensors and stations monitoring the electromagnetic spectrum. Such a solution may give the Chinese a perfect live-action view on the whole American activity, provided the satellites are modern enough to be able to transmit broadband data with appropriate protection from countermeasures. If China achieves this ability it will instantly drop off all the limitations of current *A2/AD* strategy and will be able to exploit its strike capabilities to the full extent. The United States on the other hand will the same moment lose one of its core advantages which is the superiority of the American worldwide *ISR* system, based to a great extent on the satellite detection and imaging. And this is exactly the way the Chinese follow with their space activities, currently working to establish its own space-borne, comprehensive *ISR* system.

Indeed, the Chinese treat space capabilities as crucially important support measure and they also integrate it with the other means of information support for the armed forces. It is also reflected with the recent creation of the new command structure, the PLA's Strategic Support Force (PLASSF).

"This new service (junzhong) brings together Chinese military space, electronic warfare, and network warfare capabilities and reflects the military's holistic view of space. For the Chinese military, establishing space dominance is integral to the larger effort

to establish information superiority. Consequently, the PLaSSF is expected to coordinate space, electronic warfare, and cyber operations." (Cheng)

And so, if, or rather when, China manages to create the indigenous strategic, satellite based *ISR* system, the *A2/AD* strategy encompassing designated areas will be complete and will go into effect. However, it will also become dependent on the new batch of hardware and that will pose another important limitation – the satellite systems are highly vulnerable to the opponent's counteraction exactly because of the same characteristics of the orbital mechanics that make satellites be so perfect tool of the *ISR*. As they can see everything on Earth, they can also be seen and easily targeted by earth based or orbital weapons. Although there is no "official" ASAT[5] weapon in the American arsenal, as early as in 2008 the United States shot down its own malfunctioning satellite with the *SM-3* anti-ballistic missile. Currently there are as many 33 U.S. Navy ships equipped with this system with hundreds of rockets on board, not to mention the capabilities for laser blinding of optical and infrared sensors or electromagnetic jamming of radar systems. So, in a case of the conflict or crisis, the Chinese observation, communication and positioning systems would surely be the first prey of the U.S. forces.

It might therefore look like there is nothing substantially changed, even with the advent of the Chinese satellite *ISR* systems. They are of course very useful, but in a case when they are the most badly needed it seems they would not be able to operate, so the whole *A2/AD* system would again be foiled. But it is not the case, just because by lifting the *ISR* abilities into space China is creating the new symmetry with the U.S. in military capabilities – the second one after the ability to conduct strategic thermonuclear strike against each other. It is because China is also capable to conduct extensive anti-satellite operations by cyber hacking, blinding and jamming; the Chinese forces also possess effective anti-satellite weapons. This way, in a case of the hostilities the U.S. will be equally vulnerable to the Chinese actions as they are to the American. So there emerges a kind of the balance of power in space that does not exist on the ground and that transcends beyond the *A2/AD* strategy. Incoming mutual vulnerability in this highly important and sensitive domain will bring significant political consequences. And they are going to be to a great extent the outcome of the evolution of the *A2/AD* strategy striving to go beyond its natural limitations.

The Political Implications for the Space Security

Before getting into the main theme of this article, it is worth to address some general issues that concern the term "space security". There is a lot of uncertainty with regard to this, the theoretical debate pertaining the principal issues involved has not yielded satisfactory results yet (Lutesand, Hays, Manzo, Yambrick, Bunn). In the theoretical discussion it is especially debatable how the term "space security" and its content is related or depended or even ancillary to the national security or the international security. All

[5] Commonly used abbreviation of the term "anti-satellite".

in all the outer space, as it is usually defined, is the domain of "terran" subjects – states or private entities that reside on Earth.

And so, it may be argued that the space beyond our planet is just an extension of the sphere of states' activity and their regulation authority, roughly the way the airspace is. Note, that the airspace, as a domain of the human activity, had been largely defined in terms of its relevance by a host of theoreticians in the thirties, forties and fifties of the XXth century. Its utilization had been quite precisely delineated by the nation states within the international law, following a centuries long process of the regulation of the law of the sea. Here we also have the notion of the "spacepower", coined along the analogy with the "seapower" and the "airpower" – usually it is understood as the means and methods, together with related structures that the state assemble to benefit from the space activities. This point of view is maintained by many theoreticians, mostly of the conservative orientation, who stress the role of space specifically as a state's tool.

On the other hand it should be noted, that laws of the orbital mechanics and characteristics of space as a very hostile environment make this domain entirely different from a point of view of the modes of its use and the opportunities that it presents. The most important distinction lays in the properties of motion of objects in various environments. The physical characteristics of the atmosphere and the seas allow man-made objects to maneuver freely (with certain limitations of course) – and so they are able to avoid trespassing restricted areas, sovereign territories for example. The space-borne objects, however, are kept on their trajectories by centrifugal and gravitational forces and so their paths are always the closed curves within the plane that crosses Earth's center - therefore they almost always orbit over many countries. A general misunderstanding of the properties of satellite systems is clearly visible in a common reference to their movements as a "flight". But satellites do not "fly", because this term implies the movement that is or at least may be constantly steerable. So again, satellites do not "fly", they "orbit", and that is the entirely different situation. The other very important limitations to the human space activities are: a very steep price for lifting any payload to the orbit, and extremely hostile environment that is destructive to both life and the equipment. Those constrains are so important, that all the theoreticians, even those who have the most "statecentric", unilateral view of space and so of its security, admit it first place and without hesitation (Oberg, pp. 67-85). It is therefore arguable, that the attitude opposite to a casual realist one is more functional to the understanding and defining the issue of the space security. And so, one can say, that the perspective of the international security, understood as the realm of interconnected actions, relations and attitudes together with the structure that they spawn, may give a much better insight into the nature of the space security, as the domain to an extent detached from states and not entirely defined by their will. This line of argument may lead to the conclusion that because of the features of the outer space which make it be the ultimate *global common*, naturally prone to the co-operation, the defining of the space security should be conducted within the logic of the international relations rather than from "nationcentric" perspective of the national security studies.

Summarizing this short theoretical reflection we should define the space security for the purpose of this article. So, let us recognize that when using the term "space security" we refer to the state (level, amount, degree, intensity, etc.) of the threats to the orbital infrastructure, which we understand as a part of the broader space infrastructure, both civil and military. The space security refers to both natural and man-made threats, which we define as activities or phenomena that could adversely affect orbital infrastructure. As we can see, it is rather broad understanding, where the perspective of state and its interests and the perspective of the space as a global common may be combined.

The problem of the space security, as defined above has its inherent legal dimension, too. And it is very important aspect, even if the space law, that means a branch of the international law that refers to the activities in the outer space, is not well developed. Within the area that we are discussing, where the international law is the organizer of the security system, the space law is more than sketchy and in fact confines only three principal provisions:

- the ban on the deployment of weapons of mass destruction in space and on celestial bodies,
- the ban on the establishment of military installations or fortifications and on conducting military maneuvers on celestial bodies, and
- the general stipulation that the outer space is the heritage of the Mankind and therefore should be used peacefully to benefit all the humanity.

The other important dimension of the space security is its military relevance. Since the beginning of the space age satellite systems have been used for the purposes related to the state security, but only to support warfighting capabilities, never as a weapon. But the space weaponry is feasible, either to fight in space or between space and Earth, and let us take it for granted at this point, without dwelling into the technicalities involved[6]. However, the space based weapons systems have not been constructed until today because of questionable usefulness stemming mainly from the fact that orbital assets are naturally vulnerable to attack by the ASAT systems. Which is more, many kinds of combat missions that could be attributed to space based weapons may be executed well enough by much cheaper and more reliable ground-based ones. This is rather difficult to change with today's and perspective technology, but this sober assessment does not mean that the space weapons will not be constructed – it is because the logic of the arms race is not entirely logical.

The abovementioned issue leads to the economic dimension of the space security. Satellite systems are usually very expensive and although the costs are being constantly lowered by the miniaturization and overall development of the technology they are, and will remain high. Currently used military applications are especially expensive, any space weapons system would cost much more, probably prohibitedly more, especially in the light of their questionable effectiveness and reliability. This is mainly because any space based weapon, especially the one that is supposed to strike the ground targets on a short

[6] For detailed reference on this issues see for example comprehensive report (Wright, Grego, Gronlund).

notice must consist of vast constellations of the highly sophisticated, read expensive, vehicles (Wright, Grego, Gronlund, pp. 89-104).

And finally, what interests us the most, it is the political dimension of the space security that binds together capabilities and costs with the policies of the states. This brings us back to important problems of the national security of a number of the most important countries, that strongly affect the state of the space security. Here we can find the explanation what is that determines the space security in the most profound way. It is of course about the space weapons, but rather about actual lack of them, and here we will see in full the impact of the development of the Chinese space capabilities.

As it was mentioned above, the military use of space is still limited to supporting of tasks concerning the national security, both in the peacetime, in crises or during the open war. It is worth to stress, that despite the technical capabilities they possessed, no superpower decided to weaponize space by designing effective weapons systems and fielding them in military relevant quantities. Since the dawn of the space era both global competitors mulled various projects of space based and anti-satellite weapons (Ziarnick, Garretson) (Zak), but they did not decide to turn any of them into a follow on in shape of the full scale weaponry. There was a number of economical and operational reasons, that taken together with the deterrent effect of the strategic nuclear forces made space weapons impracticable, as it was already mentioned above. But which is more, it was quite obvious that once the space based weapons had been fielded they would surely have been followed by the rapid expansion of the ASAT systems. This in turn would have meant that all the support derived from satellites was questionable, and so, since both sides were highly satisfied with the peacetime usefulness of the space-borne capabilities, they were not willing to risk them in times of crises. And thus, the space based weapons were in fact unwanted, because their deployment would have surely endangered non-combat support systems, becoming more and more critical for every aspect of the operating of the military. This was especially important for the U.S., because the Americans were always more advanced in space so they benefited very much from using the orbital systems. It especially referred to the strategic intelligence that managed to lift, at least to some extent, the curtain behind soviet nuclear and delivery capabilities, and thus contributed to maintaining the stability. Furthermore, while anti-satellite attacks posed no risk of direct human causalities, the space assets would have became tempting target in a case of the crisis at this could have lead to the politico-military escalation. This could have eventually resulted in an unwanted destruction of all the space-based capabilities of all the sides by triggering the "chain reaction" degradation of the space environment known as the Kessler effect (Kessler, Johnson, Liou, Matney). Should it happened it would have been fatal to any human activity in space. All this is why the weapons basing in space or the weapons designed to destroy space vehicles never came true during the cold war.

The political tacit consensus on non-weaponization of the outer space, which until now has shaped the space security, came under a sort of strain in the XXIst century, when China entered the space race as the full scale competitor. We have already mentioned couple of times that Beijing is very much dedicated to the development of the

attributes of the spacepower, especially in the security arena. The Chinese planners understand that without space-borne support the PLA cannot gain a worldwide relevance, and it must follow the U.S. in the development of the satellite systems (Kulacki, 2014, p. 4). Furthermore, the Chinese civilian scientific and commercial programs boost the country's prestige and are important as a demonstration the power of the Middle Kingdom, and support its successful strive to become the real global player.

The situation within the realm of the space security changed then, first of all because the new contender entered the stage where traditional players had already been very well accommodated. Its first aim is now to show its ability and prove that it is more or less equal, and that the new, triangle-shaped relations are the reality. This is what is happening now, China proves beyond the doubt that it is the real spacepower, on a verge of perfecting all the military and civilian capabilities in space. And this complicates usually simple relations of the bipolar system, because the relations within the triangle are far more complex.

But on the other hand the emerging situation has a lot in common with the traditional space security relations that were shaped by the USSR and USA. And this is very important, key assessment: China becomes more and more depended on the satellite systems, soon they will be indispensable for the role Beijing wants to perform in the world – as the example of the *A2/AD* strategy, extensively depicted in this paper shows. And note, that this strategy is just the first step for the Chinese military to counter the U.S. and to show its global ability. All this implies that satellite systems will be more and more needed and will become essential, both for military purpose and for the execution of the economic agenda – and not to mention, again, the prestige. Some experts even suggest that „[…] China's military dependence on satellites may be greater than that of the United States" (Kulacki, 2016,1). And so, however the triangle is the new shape of the base for the space security, tricky and much more difficult to manage, the main strategic goals of all three participants are the same. Their best interest is to maintain safe and secure access to space in order to benefit from it. And because of the well-known constrains – all their systems are, and will remain vulnerable – the best logical solution is to maintain the weapons-free space security system. Any disturbance in the balance may lead to the very costly and risky arms race with all its security dilemmas (or even trilemmas) and other treacherous hazards.

There is of course the question of the resilience of this triangular system, will it hold the reasonable balance despite a number of the adverse factors which are both embedded in its form, and depend on the internal drivers of state's behavior. We may easily list a number of such distractive dynamics which may lead to the rapid weaponziation of the outer space, despite all the rationales depicted above.

Firstly, it is the natural feature of the trilateral system, in which each part must watch and offset actions of the two others, and the interactions among them, as well. It means far greater uncertainty than in bilateral system, because simple action-reaction situation is replaced by much more complex sequence. For example: action–reacktion1- reacktion2–secondary 1 vs 2 interaction. Thus, the situation is exponentially more volatile and much more difficult to stabilize.

Secondly, with a close relation to the above, any agreement regarding military balance is much more difficult in the situation when the parties to it must take into account the third party's power, what Kenneth Waltz observed years ago (Waltz, p. 177). So the classic means of bilateral strategic relations would be inefficient with regard to seeking the reassurances and hammering the deal, even if it is only the tacit one. And the potentially suitable means of the multilateral diplomacy, open or informal, may be considered very inconvenient by some of the parties.

And thirdly, any country may act as a spoiler, even if would mean surrendering the benefit of the non-weaponized space security system. It may happen because of many reasons. For example, one top of the triangle may decide to scrap its own advantages in order to deny it to the others, especially while feeling inferior somehow – it could very well be Russia. The other may embark on the risky road of flexing muscles and stirring adversities out of the internal reasons – China for example. And there is always the problem, solely applying to the USA, of the declining power syndrome – the U.S. may not be ready to give up perceived superiority even if this reluctance would result in a risky change of the traditional balance.

Summarizing the argument on the possible political influence of the development of the space-based leg of the Chinese *A2/AD* strategy for the space security. The rapid development of the space systems lifts China to the position of the third space superpower (maybe Russia is still relatively weak element in that system, especially in the comparison to the U.S., but its space industry has its potential and is surely ready to join the new technological space race (Маурин). The nature of the space-borne capabilities together with the usefulness of them creates the situation when all the parties are and will be, more or less equally, depended on their equally vulnerable systems. So the logic that has ruled the perception of the space security since the dawn of the Space Age to keep space weapons free is still valid, and in the shortest form goes like this: the anti-satellite and other space weapons may surely be useful, or even indispensable during the war (but only for the short time, as space would degrade soon in the event of the orbital battle); however in the peacetime or in crises short of war it is be better to keep and use own capabilities continuously, even if the opponent would be able to do just the same.

Summary

So, as of today we are at a sort of the inflection point from where the space security may evolve in two general directions: either the rule of non-weaponization will be maintained in the newly established triangle, or there will be a space arms race with all its consequences. There are many different arguments favoring both outcomes, the most important of them were mentioned above, none of them fully convincing. But there are the others, making the situation even more complicated.

For example, not only the three space superpowers possess the ability to affect satellites, even non-state actors can do this by the means of cyber-hacking, jamming or blinding. Which is more, in theory, many countries that develop space lift capability and missile technology may design simple ASAT systems. All this takes the problem of

the space security beyond a triangle of the China-US-Russia relations and bring on the issue of the n-th power as a spoiler. Will it be suppressed, coerced to comply, or will go wild triggering the widespread arms race? On the other hand, again, we have the utility of space, especially of the civilian space sector, vital for the telecommunications and other modern applications, that would be in grave jeopardy in case of the proliferation of space weapons.

There is also unpredictable, in our increasingly unpredictable and chaotic world, what exactly would be the superpowers' attitude toward their own interests. We have already described several hypothetic situations in which some of the powers would be ready to break the lasting consensus for not exactly rational, from a point of view of the space security, reasons. But are those really so hypothetical? If, as some predict, Xi-Jinping of China really tries to break the rules and remain in power after his term expires (Kellog), he would badly need the strong legitimization for his authority. What is better for that purpose, that the external conflict and the highlighted threat of dear values with the increasingly assertive military posture as a result? Weaponizing space under the nationalist flag and against alleged or actual American thrust to do the same, would suit such a policy very well.

But perhaps, as it was already noticed above, the gravedigger of the space sanctuary system would indeed be the United States; ironically, because the U. S. benefit the most of the system that it has created. Currently in America we can observe a strong reluctance to accept China as equal partner, the stronger the more equal it actually becomes. Which is more, the Americans tend to treat space as their own domain, maybe the last one in which they possess so big advantage, and that aggravates the problem. There are even the influential calls to mobilize and move to create the U.S. hegemony in space (Dolman), by the military means of course. "Perhaps that is why some U.S. officials argue the United States should refuse to support international efforts to place limits on the use of anti-satellite weapons." (Kulacki, 2016,2).

On the other hand it is plausible, even if quite optimistic, that the superpowers will eventually reach some formal solution on the ban of the space weapons. If they manage to structure their relations properly to be able to come to sober conclusion on what is their best interest, it is possible within the decade or so. We might observe the forming condition for such process; the growing usefulness and simultaneously the pertaining vulnerability of space systems and the strengthening of the economic relevance of space. The indispensability of the orbital applications may therefore lead to the evolution of the means to protect them.

If to draw the most possible direction of the evolution of the space security with regard to the space weapons we could say that retaining of the sanctuary, at least for the time being is somehow more possible than the opposite. We think that it is the most probable that the main actors will retain their ASAT capabilities, but they will keep them in the basement, without fielding military relevant systems. But with the lack of formal agreement this situation may erode, especially with the proliferation of the missile defense, which, it may be argued, possess inherent anti-satellite capabilities. Such creeping weaponization may once explode in full scale, rendering the space be even less friendly domain that it naturally is.

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